Figure 1

SEQ ID NO:1 human interferon alpha 1 (GenBank 13128950)
MASPFALLMVLVVLSCKSSCSLGCDLPETHSLDNRRTLMLLAQMSRISPSSCLMD
RHDFGFPQEEFDGNQFQKAPAISVLHELIQQIFNLFTTKDSSAAWDEDLLDKFCTE
LYQQLNDLEACVMQEERVGETPLMNADSILAVKKYFRRITLYLTEKKYSPCAWE
VVRAEIMRSLSLSTNLQERLRRKE

SEQ ID NO:2 human interferon alpha-2a (GenBank 2781226)
CDLPQTHSLGSRRTLMLLAQMRKISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVL
HEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPLM
KEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE

SEQ ID NO:3 human interferon alpha-2b (GenBank 30171279)
MCDLPQTHSLGSRRTLMLLAQMRRISLFSCLKDRHDFGFPQEEFGNQFQKAETIPV
LHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPL
MKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE

SEQ ID NO:4 human interferon alpha 4 (GenBank 10835103)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISHFSCLKDR
HDFGFPEEEFDGHQFQKAQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTEL
YQQLNDLEACVIQEVGVEETPLMNEDSILAVRKYFQRITLYLTEKKYSPCAWEVV
RAEIMRSLSFSTNLQKRLRRKD

SEQ ID NO:5 human interferon alpha 5 (GenBank 4504597)
MALPFVLLMALVVLNCKSICSLGCDLPQTHSLSNRRTLMIMAQMGRISPFSCLKD
RHDFGFPQEEFDGNQFQKAQAISVLHEMIQQTFNLFSTKDSSATWDETLLDKFYTE
LYQQLNDLEACMMQEVGVEDTPLMNVDSILTVRKYFQRITLYLTEKKYSPCAWE
VVRAEIMRSFSLSANLQERLRRKE

SEQ ID NO:6 human interferon alpha 6 (GenBank 11128015)
MALPFALLMALVVLSCKSSCSLDCDLPQTHSLGHRRTMMLLAQMRRISLFSCLKD
RHDFRFPQEEFDGNQFQKAEAISVLHEVIQQTFNLFSTKDSSVAWDERLLDKLYTE
LYQQLNDLEACVMQEVWVGGTPLMNEDSILAVRKYFQRITLYLTEKKYSPCAWE
VVRAEIMRSFSSSRNLQERLRRKE

SEQ ID NO:7 human interferon alpha 7 (GenBank 10800142)
MARSFSLLMAVLVLSYKSICSLGCDLPQTHSLRNRRALILLAQMGRISPFSCLKDR
HEFRFPEEEFDGHQFQKTQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTELY
QQLNDLEACVIQEVGVEETPLMNEDFILAVRKYFQRITLYLTEKKYSPCAWEVVR
AEIMRSFSFSTNLKKGLRRKD

SEQ ID NO:8 human interferon alpha 8 (GenBank 4504599)
MALTFYLMVALVVLSYKSFSSLGCDLPQTHSLGNRRALILLAQMRRISPFSCLKDR
HDFEFPQEEFDDKQFQKAQAISVLHEMIQQTFNLFSTKDSSAALDETLLDEFYIELD
QQLNDLEVLCDQEVGVIESPLMYEDSILAVRKYFQRITLYLTEKKYSSCAWEVVR
AEIMRSFSLSINLQKRLKSKE

SEQ ID NO:9 human interferon alpha 10 (GenBank 4504589)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLGQMGRISPFSCLKDR
HDFRIPQEEFDGNQFQKAQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTEL

YQQLNDLEACVIQEVGVEETPLMNEDSILAVRKYFQRITLYLIERKYSPCAWEVVR
AEIMRSLSFSTNLQKRLRRKD

SEQ ID NO:10 human interferon alpha 13 (GenBank 13128966)
MASPFALLMALVVLSCKSSCSLGCDLPETHSLDNRRTLMLLAQMSRISPSSCLMD
RHDFGFPQEEFDGNQFQKAPAISVLHELIQQIFNLFTTKDSSAAWDEDLLDKFCTE
LYQQLNDLEACVMQEERVGETPLMNADSILAVKKYFRRITLYLTEKKYSPCAWE
VVRAEIMRSLSLSTNLQERLRRKE

SEQ ID NO:11 human interferon alpha 14 (GenBank 4504591)
MALPFALMMALVVLSCKSSCSLGCNLSQTHSLNNRRTLMLMAQMRRISPFSCLK
DRHDFEFPQEEFDGNQFQKAQAISVLHEMMQQTFNLFSTKNSSAAWDETLLEKFY
IELFQQMNDLEACVIQEVGVEETPLMNEDSILAVKKYFQRITLYLMEKKYSPCAW
EVVRAEIMRSFSFSTNLQKRLRRKD

SEQ ID NO:12 human interferon alpha 16 (GenBank 4504593)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISHFSCLKDR
YDFGFPQEVFDGNQFQKAQAISAFHEMIQQTFNLFSTKDSSAAWDETLLDKFYIEL
FQQLNDLEACVTQEVGVEEIALMNEDSILAVRKYFQRITLYLMGKKYSPCAWEV
VRAEIMRSFSFSTNLQKGLRRKD

SEQ ID NO:13 human interferon alpha 17 (GenBank 10880985)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISPFSCLKDR
HDFGLPQEEFDGNQFQKTQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTEL
YQQLNNLEACVIQEVGMEETPLMNEDSILAVRKYFQRITLYLTEKKYSPCAWEVV
RAEIMRSLSFSTNLQKILRRKD

SEQ ID NO:14 human interferon alpha 21 (4504595)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISPFSCLKDR
HDFGFPQEEFDGNQFQKAQAISVLHEMIQQTFNLFSTKDSSATWEQSLLEKFSTEL
NQQLNDMEACVIQEVGVEETPLMNVDSILAVKKYFQRITLYLTEKKYSPCAWEV
VRAEIMRSFSLSKIFQERLRRKE

SEQ ID NO:15 human interferon beta (GenBank 124469), signal peptide deleted
MSYNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDA
ALTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDFT
RGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

SEQ ID NO:16 human interferon kappa (GenBank 14488028)
MSTKPDMIQKCLWLEILMGIFIAGTLSLDCNLLNVHLRRVTWQNLRHLSSMSNSF
PVECLRENIAFELPQEFLQYTQPMKRDIKKAFYEMSLQAFNIFSQHTFKYWKERHL
KQIQIGLDQQAEYLNQCLEEDENENEDMKEMKENEMKPSEARVPQLSSLELRRYF
HRIDNFLKEKKYSDCAWEIVRVEIRRCLYYFYKFTALFRRK

SEQ ID NO:17 human interferon tau (GenBank 28882045)
MIIKHFFGTVLVLLASTTIFSLDLKLIIFQQRQVNQESLKLLNKLQTLSIQQCLPHRK
NFLLPQKSLSPQQYQKGHTLAILHEMLQQIFSLFRANISLDGWEENHTEKFLIQLH
QQLEYLEALMGLEAEKLSGTLGSDNLRLQVKMYFRRIHDYLENQDYSTCAWAIV
QVEISRCLFFVFSLTEKLSKQGRPLNDMKQELTTEFRSPR

SEQ ID NO:18 human interferon omega (GenBank 4504605)
MALLFPLLAALVMTSYSPVGSLGCDLPQNHGLLSRNTLVLLHQMRRISPFLCLKD
RRDFRFPQEMVKGSQLQKAHVMSVLHEMLQQIFSLFHTERSSAAWNMTLLDQLH
TGLHQQLQHLETCLLQVVGEGESAGAISSPALTLRRYFQGIRVYLKEKKYSDCAW
EVVRMEIMKSLFLSTNMQERLRSKDRDLGSS

SEQ ID NO:19 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 27 and 28, linker connection between residues 159 and 9)
SCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDK
FYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCA
WEVVRAEIMRSFSLSTNLQE-(linker)-LGSRRTLMLLAQMRKISLF

SEQ ID NO:20 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 48 and 49, linker connection between residues 159 and 9, linker = "RAGN" (SEQ ID NO:50))
KAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVG
VTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQER
AGNLGSRRTLMLLAQM RKISLFSCLKDRHDFGFPQEEFGNQFQ

SEQ ID NO:21 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 76 and 77, linker connection between residues 159 and 9, linker = "RAGN" (SEQ ID NO:50))
DETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKE
KKYSPCAWEVVRAEIMRSFSLSTNLQERAGNLGSRRTLMLLAQMRKISLFSCLKD
RHDFGFPQEEFGNQFQ KAETIPVLHEMIQQIFNLFSTKDSSAAW

SEQ ID NO:22 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 105 and 106, linker connection between residues 159 and 9, linker = "RAGN" (SEQ ID NO:50))
TETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQERA
GNLGSRR
TLMLLAQMRKISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTK
DSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGV

SEQ ID NO:23 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 27 and 28, linker connection between residues 159 and 9, linker = "WAST" (SEQ ID NO:51))
SCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDK
FYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCA
WEVVRAEIMRSFSLSTNLQEWASTLGSRRTLMLLAQMRKISLF

SEQ ID NO:24 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 48 and 49, linker connection between residues 159 and 9, linker = "WAST" (SEQ ID NO:51))
KAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVG
VTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQE-
(linker)-LGSRRTLMLLAQM RKISLFSCLKDRHDFGFPQEEFGNQFQ

SEQ ID NO:25 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 76 and 77, linker connection between residues 159 and 9, linker = "WAST" (SEQ ID NO:51))
DETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKE
KKYSPCAWEVVRAEIMRSFSLSTNLQEWASTLGSRRTLMLLAQMRKISLFSCLKD
RHDFGFPQEEFGNQFQ KAETIPVLHEMIQQIFNLFSTKDSSAAW

SEQ ID NO:26 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 105 and 106, linker connection between residues 159 and 9, linker = "WAST" (SEQ ID NO:51))
TETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQEW
ASTLGSRRT
LMLLAQMRKISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTK
DSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGV

SEQ ID NO:27 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 27 and 28, linker connection between residues 159 and 9, linker = "SGNK" (SEQ ID NO:52))
SCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDK
FYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCA
WEVVRAEIMRSFSLSTNLQESGNKLGSRRTLMLLAQMRKISLF

SEQ ID NO:28 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 48 and 49, linker connection between residues 159 and 9, linker = "SGNK" (SEQ ID NO:52))
KAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVG
VTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQES
GNKLGSRRTLMLLAQM RKISLFSCLKDRHDFGFPQEEFGNQFQ

SEQ ID NO:29 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 76 and 77, linker connection between residues 159 and 9, linker = "SGNK" (SEQ ID NO:52))
DETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKE
KKYSPCAWEVVRAEIMRSFSLSTNLQESGNKLGSRRTLMLLAQMRKISLFSCLKD
RHDFGFPQEEFGNQFQ KAETIPVLHEMIQQIFNLFSTKDSSAAW

SEQ ID NO:30 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 105 and 106, linker connection between residues 159 and 9, linker = "SGNK" (SEQ ID NO:52))
TETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESG
NKLGSRR
TLMLLAQMRKISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTK
DSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGV

SEQ ID NO:31 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 27 and 28, linker connection between residues 159 and 9, linker = "QNTKS" (SEQ ID NO:53))
SCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDK
FYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCA
WEVVRAEIMRSFSLSTNLQE-(linker)-LGSRRTLMLLAQMRKISLF

SEQ ID NO:32 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 48 and 49, linker connection between residues 159 and 9, linker = "QNTKS" (SEQ ID NO:53))
KAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVG
VTETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQEQ
NTKSLGSRRTLMLLAQM RKISLFSCLKDRHDFGFPQEEFGNQFQ

SEQ ID NO:33 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 76 and 77, linker connection between residues 159 and 9, linker = "QNTKS" (SEQ ID NO:53))
DETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYFQRITLYLKE
KKYSPCAWEVVRAEIMRSFSLSTNLQEQNTKSLGSRRTLMLLAQMRKISLFSCLK
DRHDFGFPQEEFGNQFQ KAETIPVLHEMIQQIFNLFSTKDSSAAW

SEQ ID NO:34 circularly permuted variant of interferon-alpha 2a (breakpoint located between residues 105 and 106, linker connection between residues 159 and 9, linker = "QNTKS" (SEQ ID NO:53))
TETPLMKEDSILAVRKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQEQN
TKSLGSRR
TLMLLAQMRKISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQQIFNLFSTK
DSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGV

SEQ ID NO:35 circularly permuted variant of interferon-beta (breakpoint located between residues 27 and 28, linker connection between residues 4 and 165, linker = "GD")
LEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIV
ENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKEYS
HCAWTIVRVEILRNFYFINRLTGYLRGDNLLGFLQRSSNFQCQKLLWQLNGR

SEQ ID NO:36 circularly permuted variant of interferon-beta (breakpoint located between residues 47 and 48, linker connection between residues 4 and 165, linker = "GD")
QQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLE
EKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINR
LTGYLRGDNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQL

SEQ ID NO:37 circularly permuted variant of interferon-beta (breakpoint located between residues 77 and 78, linker connection between residues 4 and 165, linker = "GD")
GWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHY
LKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRGDNLLGFLQRSSNFQCQKLLWQ
LNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSST

SEQ ID NO:38 circularly permuted variant of interferon-beta (breakpoint located between residues 109 and 110, linker connection between residues 4 and 165, linker = "GD")
DFTRGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLR
GDNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAA
LTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKE

SEQ ID NO:39 circularly permuted variant of interferon-beta (breakpoint located between residues 136 and 137, linker connection between residues 4 and 165, linker = "GD")

YSHCAWTIVRVEILRNFYFINRLTGYLRGDNLLGFLQRSSNFQCQKLLWQLNGRL
EYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVE
NLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKE

SEQ ID NO:40 circularly permuted variant of interferon-beta (breakpoint located between residues 27 and 28, linker connection between residues 4 and 165, linker = "DT")
LEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIV
ENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKEYS
HCAWTIVRVEILRNFYFINRLTGYLRDTNLLGFLQRSSNFQCQKLLWQLNGR

SEQ ID NO:41 circularly permuted variant of interferon-beta (breakpoint located between residues 47 and 48, linker connection between residues 4 and 165, linker = "DT')
QQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLE
EKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINR
LTGYLRDTNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQL

SEQ ID NO:42 circularly permuted variant of interferon-beta (breakpoint located between residues 77 and 78, linker connection between residues 4 and 165, linker = "DT")
GWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHY
LKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRDTNLLGFLQRSSNFQCQKLLWQ
LNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSST

SEQ ID NO:43 circularly permuted variant of interferon-beta (breakpoint located between residues 109 and 110, linker connection between residues 4 and 165, linker = "DT")
DFTRGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLR
DTNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAA
LTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKE

SEQ ID NO:44 circularly permuted variant of interferon-beta (breakpoint located between residues 136 and 137, linker connection between residues 4 and 165, linker = "DT")
YSHCAWTIVRVEILRNFYFINRLTGYLRDTNLLGFLQRSSNFQCQKLLWQLNGRLE
YCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVEN
LLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKE

SEQ ID NO:45 circularly permuted variant of interferon-beta (breakpoint located between residues 27 and 28, linker connection between residues 4 and 165, linker = "QS")
LEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIV
ENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKEYS
HCAWTIVRVEILRNFYFINRLTGYLRQSNLLGFLQRSSNFQCQKLLWQLNGR

SEQ ID NO:46 circularly permuted variant of interferon-beta (breakpoint located between residues 47 and 48, linker connection between residues 4 and 165, linker = "QS")
QQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLE
EKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINR
LTGYLRQSNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQL

SEQ ID NO:47 circularly permuted variant of interferon-beta (breakpoint located between residues 77 and 78, linker connection between residues 4 and 165, linker = "QS")

GWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHY
LKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRQSNLLGFLQRSSNFQCQKLLWQL
NGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSST

SEQ ID NO:48 circularly permuted variant of interferon-beta (breakpoint located between residues 109 and 110, linker connection between residues 4 and 165, linker = "QS")
DFTRGKLMSSLHLKRYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLR
QSNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAA
LTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKE

SEQ ID NO:49 circularly permuted variant of interferon-beta (breakpoint located between residues 136 and 137, linker connection between residues 4 and 165, linker = "QS")
YSHCAWTIVRVEILRNFYFINRLTGYLRQSNLLGFLQRSSNFQCQKLLWQLNGRLE
YCLKDRMNFDIPEEIKQLQQFQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVEN
LLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAKE

Figure 2

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SEQ ID NO:1    1: 24   CDLPETHSLDNRRTLMLLAQMSRISPSSCLMDRHDFGFPQEEFDGNQFQKAPAISVLHEL 83
SEQ ID NO:2   2a: 2    CDLPQTHSLGSRRTLMLLAQMRKISLFSCLKDRHDFGFPQEEF-GNQFQKAETIPVLHEM 60
SEQ ID NO:3   2b: 2    CDLPQTHSLGSRRTLMLLAQMRRISLFSCLKDRHDFGFPQEEF-GNQFQKAETIPVLHEM 60
SEQ ID NO:4    4: 24   CDLPQTHSLGNRRALILLAQMGRISHFSCLKDRHDFGFPEEEFDGHQFQKAQAISVLHEM 83
SEQ ID NO:5    5: 24   CDLPQTHSLSNRRTLMIMAQMGRISPFSCLKDRHDFGFPQEEFDGNQFQKAQAISVLHEM 83
SEQ ID NO:6    6: 24   CDLPQTHSLGHRRTMMLLAQMRRISLFSCLKDRHDFRFPQEEFDGNQFQKAEAISVLHEV 83
SEQ ID NO:7    7: 24   CDLPQTHSLRNRRALILLAQMGRISPFSCLKDRHEFRFPEEEFDGHQFQKTQAISVLHEM 83
SEQ ID NO:8    8: 24   CDLPQTHSLGNRRALILLAQMRRISPFSCLKDRHDFEFPQEEFDDKQFQKAQAISVLHEM 83
SEQ ID NO:9   10: 24   CDLPQTHSLGNRRALILLGQMGRISPFSCLKDRHDFRIPQEEFDGNQFQKAQAISVLHEM 83
SEQ ID NO:10 13: 24   CDLPETHSLDNRRTLMLLAQMSRISPSSCLMDRHDFGFPQEEFDGNQFQKAPAISVLHEL 83
SEQ ID NO:11 14: 24   CNLSQTHSLNNRRTLMLMAQMRRISPFSCLKDRHDFEFPQEEFDGNQFQKAQAISVLHEM 83
SEQ ID NO:12 16: 24   CDLPQTHSLGNRRALILLAQMGRISHFSCLKDRYDFGFPQEVFDGNQFQKAQAISAFHEM 83
SEQ ID NO:13 17: 24   CDLPQTHSLGNRRALILLAQMGRISPFSCLKDRHDFGLPQEEFDGNQFQKTQAISVLHEM 83
SEQ ID NO:14 21: 24   CDLPQTHSLGNRRALILLAQMGRISPFSCLKDRHDFGFPQEEFDGNQFQKAQAISVLHEM 83

SEQ ID NO:1    1: 84   IQQIFNLFTTKDSSAAWDEDLLDKFCTELYQQLNDLEACVMQEERVGETPLMNADSILAV 143
SEQ ID NO:2   2a: 61   IQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAV 120
SEQ ID NO:3   2b: 61   IQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAV 120
SEQ ID NO:4    4: 84   IQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNDLEACVIQEVGVEETPLMNEDSILAV 143
SEQ ID NO:5    5: 84   IQQTFNLFSTKDSSATWDETLLDKFYTELYQQLNDLEACMMQEVGVEDTPLMNVDSILTV 143
SEQ ID NO:6    6: 84   IQQTFNLFSTKDSSVAWDERLLDKLYTELYQQLNDLEACVMQEVWVGGTPLMNEDSILAV 143
SEQ ID NO:7    7: 84   IQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNDLEACVIQEVGVEETPLMNEDFILAV 143
SEQ ID NO:8    8: 84   IQQTFNLFSTKDSSAALDETLLDEFYIELDQQLNDLEVLCDQEVGVIESPLMYEDSILAV 143
SEQ ID NO:9   10: 84   IQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNDLEACVIQEVGVEETPLMNEDSILAV 143
SEQ ID NO:10 13: 84   IQQIFNLFTTKDSSAAWDEDLLDKFCTELYQQLNDLEACVMQEERVGETPLMNADSILAV 143
SEQ ID NO:11 14: 84   MQQTFNLFSTKNSSAAWDETLLEKFYIELFQQMNDLEACVIQEVGVEETPLMNEDSILAV 143
SEQ ID NO:12 16: 84   IQQTFNLFSTKDSSAAWDETLLDKFYIELFQQLNDLEACVTQEVGVEEIALMNEDSILAV 143
SEQ ID NO:13 17: 84   IQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNNLEACVIQEVGMEETPLMNEDSILAV 143
SEQ ID NO:14 21: 84   IQQTFNLFSTKDSSATWEQSLLEKFSTELNQQLNDMEACVIQEVGVEETPLMNVDSILAV 143

SEQ ID NO:1    1: 144 KKYFRRITLYLTEKKYSPCAWEVVRAEIMRSLSLSTNLQERLRRKE 189
SEQ ID NO:2   2a: 121 RKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE 166
SEQ ID NO:3   2b: 121 RKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE 166
SEQ ID NO:4    4: 144 RKYFQRITLYLTEKKYSPCAWEVVRAEIMRSLSFSTNLQKRLRRKD 189
SEQ ID NO:5    5: 144 RKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSLSANLQERLRRKE 189
SEQ ID NO:6    6: 144 RKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSSSRNLQERLRRKE 189
SEQ ID NO:7    7: 144 RKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSFSTNLKKGLRRKD 189
SEQ ID NO:8    8: 144 RKYFQRITLYLTEKKYSSCAWEVVRAEIMRSFSLSINLQKRLKSKE 189
SEQ ID NO:9   10: 144 RKYFQRITLYLIERKYSPCAWEVVRAEIMRSLSFSTNLQKRLRRKD 189
SEQ ID NO:10 13: 144 KKYFRRITLYLTEKKYSPCAWEVVRAEIMRSLSLSTNLQERLRRKE 189
SEQ ID NO:11 14: 144 KKYFQRITLYLMEKKYSPCAWEVVRAEIMRSFSFSTNLQKRLRRKD 189
SEQ ID NO:12 16: 144 RKYFQRITLYLMGKKYSPCAWEVVRAEIMRSFSFSTNLQKGLRRKD 189
SEQ ID NO:13 17: 144 RKYFQRITLYLTEKKYSPCAWEVVRAEIMRSLSFSTNLQKILRRKD 189
SEQ ID NO:14 21: 144 KKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSLSKIFQERLRRKE 189
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Replacement Sheet for Figure 3

Figure 3

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SEQ ID NO:16  IFNK: ldcnllnvhlrrvtwqnlrhlssmsnsfpveclreniafelpqeflqytq
SEQ ID NO:15  1AU1: MSYNLLGFLQRSSNFQCQKLLWQLNGRLEY-CLKDRMNFDIPEEIKQLQQ
SEQ ID NO:54  1B5L:   CYLSRKLMLDAR-ENLKLLDRMNRLSPHSCLQDRKDFGLPQEMVEGDQ
SEQ ID NO:2   1ITF:   CDLPQTHSLGSR-RTLMLLAQMRKISLFSCLKDRHDFGFPQE-EFGNQ

SEQ ID NO:16  IFNK: pmkrdikkafyemslqafnifsqht--fkywkerhkqiqigldqqaeyln
SEQ ID NO:15  1AU1: FQKEDAALTIYEMLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLK
SEQ ID NO:54  1B5L: LQKDQAFPVLYEMLQQSFNLFYTEHSSAAWDTTLLEQLCTGLQQQLDHLD
SEQ ID NO:2   1ITF: FQKAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLE

SEQ ID NO:16  IFNK: qcleedenenedmkemkenemkpsearvpqlsslelrryfhridnflkek
SEQ ID NO:15  1AU1: TV-------------LEEKLEKEDFTRGKLMSSLHLKRYYGRILHYLKAK
SEQ ID NO:54  1B5L: TC------------------------RG|MDPIVTVKKYFQGIYDYLQEK
SEQ ID NO:2   1ITF: AC-------------VIQGVGVTETPLMKEDSILAVRKYFQRITLYLKEK

SEQ ID NO:16  IFNK: kysdcaweivrveirrclyyfykftalfrrk
SEQ ID NO:15  1AU1: EYSHCAWTIVRVEILRNFYFINRLTGYLRN
SEQ ID NO:54  1B5L: GYSDCAWEIVRVEMMRALTVSTTLQKRLTK
SEQ ID NO:2   1ITF: KYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE
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